VACCINES
Rejuvenating viral vectors
Adenoviral (Ad5) vaccine vectors elicit mixed responses: They induce protective CD8+ T cells, but these cells may be partially exhausted. Now Larocca et al. demonstrate that this exhausted phenotype may result from Ad5 vector–induced antigen-specific CD4+ T cells that express interleukin-10 (IL-10) and PD-1 in both mice and macaques. These IL-10+ CD4+ T cells suppress the vaccine-induced CD8+ T cell response, and their inhibitory function may depend in part on IL-27. Targeting this inhibitory pathway may thus enhance protection of viral vector–based vaccines. —AC

OPTICS
Shrinking spectrometers
Dual-comb spectroscopy is a powerful technique that uses the interference of two closely related combs to map spectroscopic features directly into a frequency domain that can be read by electronics. Suh et al. developed a dual-comb spectroscopy approach using combs produced by silica microresonators fabricated on a silicon chip. Perhaps high-resolution spectroscopy will soon be shrinked to the chip scale, doing away with the need for bulky spectrometers. —ISO
Science, this issue p. 600

OCEAN CHEMISTRY
Uranium in the deep sea
The ratio of $^{234}$U to $^{238}$U in seawater underlies modern marine uranium-thorium geochronology, but it is difficult to establish the ratio precisely. Chen et al. report two $^{234}$U/$^{238}$U records derived from deep-sea corals (see the Perspective by Yokoyama and Esat). The records reveal a number of important similarities to and differences from existing records of the past 30,000 years. Higher values during the most recent 10,000 years than during earlier glaciated conditions may reflect enhanced subglacial melting during deglaciation. —HJS
Science, this issue p. 626; see also p. 550

NEUROSCIENCE
Cognition, behavior, and the globus pallidus
Deep inside the brain, the external segment of the globus pallidus receives many inputs from the neighboring basal ganglia. Its role in basic cognitive functions has rarely been measured directly. While monkeys were learning a complex task, Schechtman et al. recorded discharges from prototypical neurons in the structure. The

IN OTHER JOURNALS
Edited by Caroline Ash and Jesse Smith

PUBLIC HEALTH
Worms remodel immune responsiveness
Rural populations in less developed countries commonly show poor immunogenicity in vaccination programs. Helminth infections remain common in some rural areas, and cellular immune hyporesponsiveness is a hallmark of chronic helminth infections. Community deworming programs are in general believed to be a good thing to reverse the morbidity that a large worm burden can impose on children. Wammes et al. set up a 2-year clinical trial to systematically test the immunological consequences of deworming in >1000 villagers in Indonesia. After treatment, subjects showed significant immune remodeling, with reduced expression of CTLA-4 (cytotoxic T lymphocyte–associated antigen 4) and elevated proinflammatory cytokine responses to malaria parasite antigens. The challenge in the longer term could be that restored immune responsiveness might increase the prevalence of inflammatory diseases. —CA

PLANT SCIENCE
Soil microbes yield insecticidal peptide
The microbial peptide BT, derived from the bacterium Bacillus thuringiensis, is widely used to protect crops from insect pests. Schellenberger et al. identified another insecticidal peptide from a different soil-dwelling bacterium, Pseudomonas chlororaphis (see the Perspective by Tabashnik). Corn plants expressing the Pseudomonas peptide were protected from attack by western corn rootworm. Rootworms that were resistant to BT were susceptible to the Pseudomonas peptide. Addition of another insecticidal peptide diversifies the arsenal against insect pests, which may slow down the development of resistance. —PJH
Science, this issue p. 634; see also p. 552

POROUS MATERIALS
Printing emulsions and foams in 3D
The properties of porous materials can depend on the overall volume, size, and size distribution of the pores, but these can be difficult features to simultaneously control during fabrication. Emulsion or foam techniques can produce pores of only one narrow size range, but in combination with a direct ink-writing process, Minas et al. developed an approach to create porous materials with highly tunable properties. —CA

RESEARCH
IN SCIENCE JOURNALS

Printed cubic lattice scaffold for the creation of porous ceramics
A printed cubic lattice scaffold for the creation of porous ceramics

Edited by Jesse Smith
animals had to switch to a new stimulus-reward association once a predefined learning criterion had been reached. The activity of the neurons predicted whether the monkeys would change or maintain their previous stimulus choice. Neuronal spike activity also encoded whether such choices were successful. When the animals’ performance became more automated and less demanding, discharge rates in the context of choice selection decreased. —PRS

**CELL BIOLOGY**

**Microtubule repair and rescue**
The microtubule network that forms the cytoskeleton is essential for cell polarization and migration. Microtubules tend to grow slowly, and they can shrink rapidly in a process known as catastrophe. Aumeier et al. report that where the network is dense, microtubules bend and cross over, leading to increased mechanical stress and filament damage. Damaged filaments can self-repair in a process that also prevents complete depolymerization. Most of the tubulin incorporates into the growing ends of microtubules, but some incorporates along the shaft of preexisting microtubules at damaged regions. This repair-and-rescue mechanism provides insight into how the network can remain stable in this highly dynamic system. —SH and SMH

**CHEMISTRY**

**Sourcing hydrogen directly from wax**
Hydrogen is an appealing fuel because of the energy released in its reaction with oxygen and the nearly ideal safety profile of the sole product, water. The challenge lies in transporting and storing the hydrogen before its use. Gonzalez-Cortes et al. now show that simple paraffin wax can be an efficient source of hydrogen under the right circumstances. Specifically, they embedded carbon-supported ruthenium nanoparticles in the wax and then irradiated it with microwaves, thereby releasing up to half of the available gravimetric hydrogen content. The authors attribute the catalytic efficiency to a possible combination of local superheating and field-induced plasma formation. —JSY

**EDUCATION**

**What a (scientific) argument is not**
Engaging in arguments based on evidence is a practice found in STEM (science, technology, engineering, and mathematics) education frameworks. Are students being taught to argue evidence in the same way that professional scientists do? MacPherson interviewed 10 ecologists about arguments both current and ongoing in their field. These data were compared to ecological arguments portrayed in assessment tasks written for middle and high school science students. Ecologists discussed causal claims, whereas school science tasks instead focused on descriptive and prescriptive claims. This mismatch results in students not receiving an accurate picture of how professional ecologists argue. How can the STEM education community move forward with designing tasks that ask students to critique evidence in a truly scientific way? —MM

**NEURODEVELOPMENT**

**Layered haircut underlies hearing**
Hair cells deep within the ear transduce sound into hearing. On any single hair cell, a pack of stereocilia is neatly arranged from tallest to shortest. When the stereocilia do not develop adequately, deafness ensues. Studying mice, Tarchini et al. discovered some of the key signaling components that organize stereocilia during development. Two regulators of G proteins, the leucine-glycine-asparagine repeat protein and an inhibitory α-subunit of heterotrimeric G protein, coordinate to define the tallest row of stereocilia. Both regulators are expressed in the bare zone of the hair cell, a surface domain that will not produce stereocilia, and also in the very tips of the row of stereocilia adjacent to the bare zone. These stereocilia will emerge as the tallest of the crowd. If this signaling pathway is disrupted, stereocilia develop to more even and modest heights, and the animal is deaf. —PJH

**ASCARIS LUMBRICOIDES**

*Ascaris lumbricoides* is a common parasite of humans.

**HISTORICAL**

**Moving: Science Education in a Global Context**
The history of education includes many transitions—everywhere, in all fields. The Common Core State Standards, the Next Generation Science Standards, and their international equivalents all represent such a transition in science education. In this special issue of *Science*, authors reflect on such transitions and offer new ideas about how to make education more effective. —LJS

**EXPLORING THE DYNAMICS OF BOOLEAN NETWORKS**

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